

**Draft Engineering Evaluation  
USDA Agricultural Research Center, Plant # 1855  
800 Buchanan Street, Albany, CA 94710  
Application # 13373**

**BACKGROUND**

The applicant, USDA Agricultural Research Center in Albany, has applied to install a new, emergency back-up generator equipped with a particulate filter. The equipment is:

**S-14    Emergency Diesel Generator, Deere JS170UC, 244BHP  
A-14    Nett SF1100-4.0 Catalyzed Diesel Filter**

The Emergency Diesel Engine Generator Set (S-14) is equipped with the best available control technology (BACT) for minimizing the release of air borne criteria pollutants and harmful air toxins due to fuel combustion. The criteria pollutants are nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), precursor organic compounds (POC) from unburned diesel fuel, sulfur dioxide (SO<sub>2</sub>) and particulate matter (PM<sub>10</sub>). All of these pollutants are briefly discussed on the District's web site at [www.baaqmd.gov](http://www.baaqmd.gov).

The engine has a smoke puff limiter, electronic control module, turbocharger, charge air cooler and direct Diesel fuel injection. The engine, S-14, is CARB certified in Executive Order U-R-004-0170 dated December 23, 2003, and EPA certified in Certificate of Conformity Number JDX-NR6-04-08 dated December 17, 2003. The Catalyzed Diesel Filter, A-14, is certified by the manufacturer, Nett Technologies, to remove at least 85% of the Diesel particulate emissions. The engine will burn commercially available California low sulfur or ultra low sulfur Diesel fuel. The sulfur content of the Diesel fuel will not exceed 0.05% by weight. The operation of this engine, S-14, should not pose any health threat to the surrounding community or the public at large.

**EMISSIONS CALCULATIONS**

The S-14 Diesel Engine has been certified by CARB to be a cleaner burning engine. Except for SO<sub>2</sub>, the emission factors for this engine are from the CARB Certification (CARB Executive Order # U-R-004-0170), summarized as follows:

NO <sub>x</sub> + HC:	5.9 gm/kw-hr x .7457 kw/hp = 4.40 gm/Bhp-hr
CO	0.6 gm/kw-hr x .7457 kw/hp = 0.447 gm/Bhp-hr
PM	0.18 gm/kw-hr x .7457 kw/hp = 0.134 gm/Bhp-hr

Tier 2 engines use a combined NO<sub>x</sub> + HC specification. Based on District guidelines, 100% of this specification is used for a NO<sub>x</sub> emission factor and 3% of this specification is used for the POC emission factor. The SO<sub>2</sub> emission factor of 0.00205 lb SO<sub>2</sub>/Bhp-hr is from AP-42, Fifth edition, Table 3.3-1 (0.00205 lb/Bhp-hr x 453.6 gm/lb = 0.930 gm/Bhp-hr). The engine will be permitted for 50 hours annually for maintenance and reliability purposes, the maximum allowed by the CARB Stationary Diesel Engine Air Toxic Control Measure (Section 93115, title 17, California Code of Regulations, part (e)(2)(A)3.a.i.iii).

The abatement factors for A-14, Catalyzed Diesel Filter, are as follows:

PM: 85-95%  
 CO: 70-90%  
 Hydrocarbon: 60-90%

The emission calculations are as follows:

Hours of Operation = 50 hr/yr (1/2 hour per week plus 24 extra hours for troubleshooting)  
 Fuel Consumption = 12.1 gal/hr  
 Estimated Fuel Usage = 12.1 gal/hr X 50 hr/yr = 605 gal/yr.  
 Engine power = 244 BHP

NO<sub>x</sub> = 4.40 gm/bhp-hr (244 hp)(1 lb/453.6 gm)(50 hr/yr) = 118.3 lb/yr or 0.059 TPY

CO = 0.447 gm/bhp-hr (244 hp)(1 lb/453.6 gm)(50 hr/yr) = 12.02 lb/yr unabated emissions.

POC = (4.40)(.03) gm/bhp-hr (244 hp)(1 lb/453.6 gm)(50 hr/yr) = 3.55 lb/yr unabated emissions

PM<sub>10</sub> = 0.134 gm/bhp-hr (244 hp)(1 lb/453.6 gm)(50 hr/yr) = 3.60 lb/yr unabated emissions.

SO<sub>2</sub> = (0.00205 lb/bhp-hr)(244 hp)(50 hr/yr) = 25.0 lb/yr or 0.013 TPY

CO, POC and PM<sub>10</sub> emissions are abated by A-14 Catalyzed Diesel Filter. The abated emissions are as follows:

CO (abated) = (0.447) (244 hp) (1/453.6)(50)(1-.70) = 3.61 lb/yr or 0.0018 TPY

POC (abated) = (4.40)(.03) (244 hp)(1/453.6)(50)(1-.60) = 1.42 lb/yr or 0.0007 TPY

PM<sub>10</sub> (abated) = (0.134)(244 hp)(1/453.6)(50)(1-.85) = 0.54 lb/yr or 0.00027 TPY

The effective abated emission factors are as follows:

CO: 3.61 lb/yr x 453.6 g/lb / 50 hr/yr / 244 Bhp = 0.134 g/Bhp-hr

POC: 1.42 lb/yr x 453.6 g/lb / 50 hr/yr / 244 Bhp = 0.053 g/Bhp-hr

PM<sub>10</sub>: 0.54 lb/yr x 453.6 g/lb / 50 hr/yr / 244 Bhp = 0.020 g/Bhp-hr

#### Summary of Abated S-14 Diesel Engine Emissions

Pollutant	Abated Emission Factor (gm/Bhp-hr)	Daily Emissions (lb/day)	Annual Emissions (lb/yr)	Cumulative Increase (Ton/yr)
Nitrogen Oxides	4.40	1.18	118.3	0.0592
Carbon Monoxide	0.134	0.0361	3.61	0.0018
POC	0.053	0.0142	1.42	0.0007
PM-10	0.020	0.00541	0.541	0.0003
Sulfur Dioxide	0.930	0.25	25.1	0.0125

Daily emissions = EF \* 244 HP \* 0.5 hr/day / 453.6 gm/lb. Annual emissions based on 50hr/yr.

## **PLANT CUMULATIVE EMISSIONS**

The plant cumulative emissions in tons/yr are summarized below. Total hydrocarbons in the engine exhaust are assumed to be all POC emissions.

**Summary of S-14 Cumulative Emissions**

	<b>Current</b>	<b>Increase (S-14)</b>	<b>Total</b>
<b>Pollutant</b>	Ton/year	Ton/year	Ton/year
<b>NOx</b>	0.888	0.0592	0.947
<b>CO</b>	0.512	0.0018	0.514
<b>POC</b>	0.133	0.0007	0.134
<b>PM10</b>	0.142	0.0003	0.142
<b>SOx</b>	0.022	0.0125	0.035

## **TOXICS RISK SCREENING ANALYSIS**

This application required a Toxics Risk Screening because of the Diesel particulate emissions.

S-14 meets Best Available Control Technology for toxics (TBACT) since the Diesel particulate emissions are less than 0.15 gm/bhp-hr. For an engine that meets the TBACT requirement, it must also pass the toxic risk screening level of less than ten in a million. The cancer risk is conservative. It assumes a constant exposure of the ultra sensitive population (young people, the elderly, and the infirmed, etc.) at 24 hours for a 70 years life.

This emergency generator passed the Health Risk Screening Analysis (HRA) conducted on October 6, 2005 by the District's Toxic Evaluation Section. (The analysis estimates the incremental health risk resulting from toxic air contaminant emissions from the operation of S-14 standby generator and one previously permitted standby generator engine. The previously permitted Diesel engine was included in the risk screen because it was permitted within two years of the S-14 application.) The analysis results demonstrated that the emissions pose no significant toxic risk, since the risks to the maximally exposed receptors are 5.0 in a million. The level of risk for students at Oceanview Elementary and MacGregor High School is much lower. The CARB Stationary Diesel Engine ATCM and the permit conditions for S-14 will prevent engine testing during school hours. Thus, in accordance with the District's Risk Management Policy, the risk screen passes since the engine meets the TBACT requirement of 0.1 gm/BHP-hr limitation for particulate emission.

## **OFFSETS**

Total facility emissions, including this project, will be less than 10 tons per year of POC and NOx. Therefore, in accordance with Regulation 2-2-302, Offsets do not apply.

## **BACT/TBACT**

The engine emits less than 10 lbs/day of all criteria pollutants based on a ½ -hour operating day for maintenance/reliability operations. However, for the purposes of a Best Available Control Technology (BACT) determination, emissions due to a 24 hr/day operation need to be considered. Based on the worst case 24 hr/day operation, the emissions are as summarized below:

<b>Pollutant</b>	<b>CARB Certified Emission Factor (gm/BHP-hr)</b>	<b>S-14 Abated Emission Factor (gm/BHP-hr)</b>	<b>Daily Emissions (lb/day)</b>	<b>BACT(2) (gm/BHP-hr)</b>
<b>Nitrogen Oxides</b>	4.40	4.40	56.8	6.90
<b>Carbon Monoxide</b>	0.447	0.134	1.7	2.75
<b>POC (3% of NOx)</b>	0.132	0.053	0.7	1.50
<b>PM-10</b>	0.134	0.020	0.3	0.10
<b>Sulfur Dioxide</b>	N/A	0.930	12.0	Low Sulfur Diesel

Daily emissions = EF \* 244 HP \* 24 hr/day / 453.6 g/lb.

S-14 triggers BACT since the emission rate of NOx and SO<sub>2</sub> from this source are more than 10 pounds of emission per highest day per Regulation 2-2-301. Source S-14 will comply with BACT(2) for NOx because it is CARB certified at the level below the BACT(2) requirements. Compliance with BACT(2) for SO<sub>2</sub> is achieved by using commercially available Diesel fuel with a sulfur content not to exceed 0.05 wt% sulfur. BACT(2) requirements are shown above and can be found on the District's web site under BACT/TBACT Handbook, Section 2 – Combustion Sources for I.C. Engine – Compression Ignition > 175 HP, Document # 96.1.2 (<http://www.baaqmd.gov/pmt/bactworkbook/96-1-2.htm>).

## **CARB STATIONARY DIESEL ENGINE ATCM**

Since this engine was installed after January 1, 2005, it is a new standby engine. Therefore, the engine is required to comply with subsection (e)(2)(A) of the ATCM. Specifically, S-14 will comply with the following requirements:

(e)(2)(A)1. At-School and Near-School Provisions. No owner or operator shall operate a new stationary emergency standby diesel-fueled CI engine for non-emergency use, including maintenance and testing, during the following periods:

b. between 7:30 a.m. and 3:30 p.m. on days when school is in session, if the engine is located within 500 feet of school grounds. Subsection (e)(2)(A)1 does not apply if the engine emits no more than 0.01 g/bhp-hr of diesel PM.

(e)(2)(A)2. No owner or operator shall operate any new stationary emergency standby diesel-fueled CI engine (>50 bhp) in response to the notification of an impending rotating outage, unless all the following criteria are met:

- the engine's permit to operate allows operation of the engine in anticipation of a rotating outage, or the District has established a policy or program that authorizes operation of the engine in anticipation of a rotating outage; and
- the Utility Distribution Company has ordered rotating outages in the control area where the engine is located, or has indicated it expects to issue such an order at a specified time; and
- the engine is located in a specific location that is subject to the rotating outage; and

- d. the engine is operated no more than 30 minutes prior to the time when the Utility Distribution Company officially forecasts a rotating outage in the control area; and
- e. the engine operation is terminated immediately after the Utility Distribution Company advises that a rotating outage is no longer imminent or in effect.

(e)(2)(A)3.a. Diesel PM Standard and Hours of Operating Requirements

I. General Requirements: New stationary emergency standby diesel-fueled engines (>50 bhp) shall:

- i. emit diesel PM at a rate less than or equal to 0.15 g/bhp-hr; or
- ii. meet the current model year diesel PM standard specified in the Off-Road Compression Ignition Engine Standards for off-road engines with the same maximum rated power (title 13 CCR, section 2423), whichever is more stringent; and
- iii. not operate more than 50 hours per year for maintenance and testing purposes, except as provided in (e)(2)(A)3.a.II. This subsection does not limit engine operation for emergency use and for emission testing to show compliance with (e)(2)(A)3.

The engine will also comply with the following other applicable requirements of the ATCM:

(e)(1)(B). The engine is required to use only CARB certified fuel, requiring refilling of any fuel tanks with 15ppm Sulfur Diesel after January 1, 2006 (any 500 ppm Sulfur Diesel can be used until consumed).

(e)(4)(G)1. A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed upon engine installation, or by no later than January 1, 2005, on all engines subject to all or part of the requirements of subsection (e)(2), unless the District determines on a case-by-case basis that a non-resettable hour meter with a different minimum display capability is appropriate in consideration of the historical use of the engine and the owner or operator's compliance history.

(e)(4)(G)2. All DPFs installed pursuant to the requirements in subsection (e)(2) must, upon engine installation or by no later than January 1, 2005, be installed with a backpressure monitor that notifies the owner or operator when the high backpressure limit of the engine is approached.

(e)(4)(I). Reporting Requirements for Emergency Standby Engines

1. Starting January 1, 2005, each owner or operator of an emergency standby diesel-fueled CI engine shall keep a monthly log of usage that shall list and document the nature of use for each of the following:

- a. emergency use hours of operation;
- b. maintenance and testing hours of operation;
- c. hours of operation for emission testing to show compliance with subsections (e)(2)(A)3. and (e)(2)(B)3.;
- d. initial start-up hours;
- e. [Not applicable to S-14];
- f. hours of operation for all uses other than those specified in subsections (e)(4)(I)1.a through (e)(4)(I)1.d. above; and
- g. [Not applicable to S-14]

2. Log entries shall be retained for a minimum of 36 months from the date of entry. Log entries made within 24 months of the most recent entry shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request. Log entries made from 25 to 36 months from most recent entry shall be made available to District staff within 5 working days from request.

## **STATEMENT OF COMPLIANCE**

Source S-14 is subject to and expected to be in compliance with the requirements of District Regulation 1-301 "Public Nuisance", District Regulation 6 "Particulate Matter and Visible Emissions", Regulation 9-8 "NO<sub>x</sub> and CO from Stationary Internal Combustion Engines" and Regulation 9-1 "Sulfur Dioxide". In order to ensure compliance with the requirements of these regulations, the facility will be conditionally permitted to meet the requirements.

This project is considered to be ministerial under the District's CEQA Regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors in accordance with Permit Handbook Chapter 2.3.

The project is within 1000 feet of the nearest school and therefore the owner/operator is subject to the public notification requirements of Reg. 2-1-412. A public notice was prepared and sent to:

All addresses within ¼ mile of the Diesel generator.  
Parents and guardians of students at Oceanview Elementary School.  
Parents and guardians of students at MacGregor High School.

S-14 is subject to and in compliance with the requirements of the CARB Stationary Diesel Engine ATCM.

A Best Available Control Technology (BACT) review is required for any new or modified source that results in a cumulative emissions increase for POC, NPOC, NO<sub>x</sub>, SO<sub>2</sub>, PM<sub>10</sub>, or CO of greater than 10 pounds per highest day. S-14 will exceed the 10 pounds limit for NO<sub>x</sub> and SO<sub>2</sub> when operated for a 24-hour period. A BACT analysis indicates that this engine complies with the District BACT2 Standard, which is acceptable under the District's policy for emergency standby generators.

A toxic risk screen was performed for the PM<sub>10</sub> engine emissions, and was found to be in compliance with the District's Risk Management Policy.

Prevention of Significant Deterioration (PSD), New Source Performance Standards (NSPS), Offsets and National Emissions Standards for Hazardous Air Pollutants (NESHAPs) do not apply to this application.

## **PERMIT CONDITIONS**

The following permit condition will apply to S-14:

USDA Agricultural Research Center  
800 Buchanan Street  
Albany, CA 94710  
Plant 1855  
S-14 Emergency Diesel Generator, Deere JS170UC, 244BHP  
Abated by A-14 Nett SF1100-4.0 Catalyzed Diesel Filter

1. The owner or operator shall operate S-14, stationary emergency standby engine, only to mitigate emergency conditions or for reliability-related activities

- (maintenance and testing). Operating while mitigating emergency conditions and while emission testing to show compliance with this part is unlimited. Operating for reliability-related activities is limited to 50 hours per year.  
(Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)3)
2. The owner/operator shall equip S-14 emergency standby engine(s) with:
    - a. a non-resettable totalizing meter, with a minimum display capability of 9,999 hours, that measures the hours of operation for the engine; and
    - b. a Diesel particulate filter backpressure monitor that notifies the owner/operator that the backpressure limit of the engine is approached.(Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations)
  3. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 36 months from the date of entry. Log entries shall be retained on-site, either at a central location or at the engine's locations, and made immediately available to the District staff upon request.
    - a. Hours of operation (emergency).
    - b. Hours of operation (maintenance and testing).
    - c. Hours of operation for emission testing to show compliance with emission limits.
    - d. Initial Startup hours.
    - e. For each emergency, the nature of the emergency condition.
    - f. Hours of operation for any uses other than those specified in 3a through 3d above.
    - g. CARB Certification Executive Order for the engine.(Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, Regulation 1-441)
  4. The owner or operator shall not operate S-14, stationary emergency standby diesel-fueled engine, for non-emergency use, including maintenance and testing, between 7:30 a.m. and 3:30 p.m. on days when school is in session.  
(Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)1)

## **RECOMMENDATIONS**

It is recommended that an Authority to Construct be waived and a Permit to Operate be issued to USDA Agricultural Research Center for:

**S-14    Emergency Diesel Generator, Deere JS170UC, 244BHP**  
**A-14    Nett SF1100-4.0 Catalyzed Diesel Filter**

**Draft Evaluation Report**  
**USDA Agricultural Research Center**  
**Plant # 1855**  
**Application 13373**  
**Page 8 of 8**

by: \_\_\_\_\_ Date: \_\_\_\_\_

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